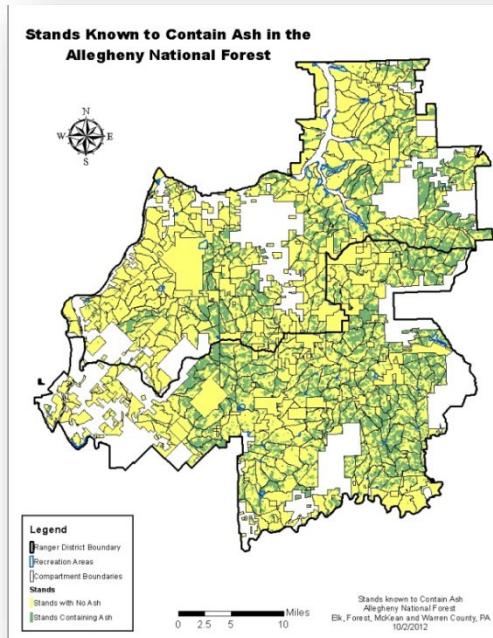


# Ash Survey of High Value Stands on the Allegheny National Forest 2011-2012



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## Abstract

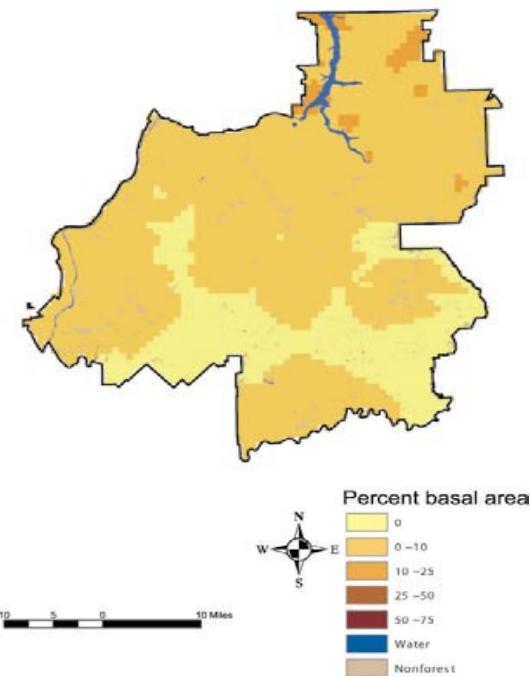
During the summers of 2011 and 2012 U.S. Forest Service TEAMS enterprise unit and Allegheny National Forest (ANF) personnel conducted a survey of prioritized recreation areas and other high value stands. The purpose of this project was to 1) identify stands that are susceptible and vulnerable to the emerald ash borer, 2) inventory these stands and 3) prioritize stands for monitoring and ash management. Sixty four stands, twenty on the Marienville Ranger District and 44 on the Bradford Ranger District covering more than 1,500 acres were surveyed in this project. No surveyed stands on the Marienville Ranger District were found to contain ash. Thirty one stands on the Bradford Ranger District were found to contain ash. No signs or symptoms consistent with the emerald ash borer (e.g. epicormic branching, woodpecker activity, bark splitting, or boring insects) were noted in any of the ash trees surveyed. The information gathered in this survey can now be used by both FHP and ANF personnel to prioritize areas for surveys, and better allocate resources as the ANF develops an ash management plan for the forest.

## Purpose and Need

The purpose of this project was to collect tree inventory data on recreation areas and other high value stands within the ANF during the summers of 2011 and 2012. Recreation areas are the most visited areas of the forest but many have never had the trees and vegetation inventoried. With forest health issues such as, emerald ash borer (EAB) *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae) and hemlock wooly adelgid (HWA) *Adelges tsugae* Annand (Hemiptera: Adelgidae) looming it is important to have inventory and tree data regarding these recreational areas because these areas often serve as pathways for introduction by visitors, and they are part of the national forest that the public most often sees.

## Project Location/Description

The Allegheny National Forest is located in northwestern Pennsylvania in parts of Elk, Forest, Jefferson, McKean, and Warren counties ( $41^{\circ}45'N$ ,  $-79^{\circ}00'W$ ). The ANF covers approximately 517,000 acres of which 463,000 acres are forested. The ANF lies within the hemlock-white pine-northern hardwood region (Braun, 1950). The hemlock-northern hardwood



**Figure 1.** Kriged surface of percent basal area of white ash on ANF (Morin *et al.*, 2006)

forest type of pre-settlement times was composed mainly of eastern hemlock (*Tsuga canadensis*) and American beech (*Fagus grandifolia*), and it has been replaced by the current mixed upland hardwoods and cherry-maple (Allegheny hardwood) types (Whitney, 1990; Morin *et al.*, 2006). Currently, black cherry (*Prunus serotina*) and red maple (*Acer rubrum*) are the most abundant species in the ANF (Morin *et al.*, 2006). White ash (*Fraxinus americana*; figure 1) makes up ~ 2% of the basal area on the ANF (Morin *et al.*, 2006).

The ANF has over 800 campsites on 18 developed campgrounds. In addition the ANF has 6 boat launches, 6 canoe access sites, 2 congressionally designated Wilderness Areas and 1 congressionally designed National Recreation Area and miles of all-terrain vehicle (ATV), mountain biking, snowmobile and hiking trails.

## Project Objectives

The objectives for this evaluation were to 1) identify stands susceptible and vulnerable to the emerald ash borer, 2) inventory these stands and 3) prioritize stands for monitoring and ash management.

## Project Methods

### *Area Selection*

All the recreation areas and dispersed use areas in the national forest were prioritized by ANF personnel based on the amount of public use and the amount of ash (*Fraxinus* spp.) present in adjacent stands. Sixty-four areas were identified for survey. Recreation areas and stand boundaries defined by shape files were provided by the ANF.

### *Data collected*

The field data collection procedures was based on the U.S. Forest Service common stand exam protocols (USDA, 2012) . The number of plots established in each area or stands was determined based on its defined acreage as follows: 1-5 acres=3 plots, 6-10 acres=7 plots, 11-20 acres=10 plots , >20 acres=10 plots+1 plot for every additional 7 acres. The plots were distributed systematically using a grid pattern over each area or stand. Data was collected electronically using “Quick Plot” exam protocols by personnel from the U.S. Forest Service TEAMs enterprise unit. At each sampling point, two plots were established using a 10-factor variable-radius overstory tree plot (Beers and Miller, 1964), and along with a six foot fixed-radius understory plot. On the overstory plot all trees larger than 1 inch dbh (diameter at 4.5 ft. above the ground) were sampled. Data was collected on species, status (alive or dead),

**Table 1.** Distribution of Region 9 forest type stands sampled.

Forest type	Percent of stands
Unclassified	40.9
Allegheny hardwoods	22.7
Mixed hardwoods	12.1
Northern hardwoods	9.1
Red pine	6.1
Red maple (dry)	3.0
Northern red oak	3.0
Mixed oak hardwoods	1.5
Sugar maple	1.5

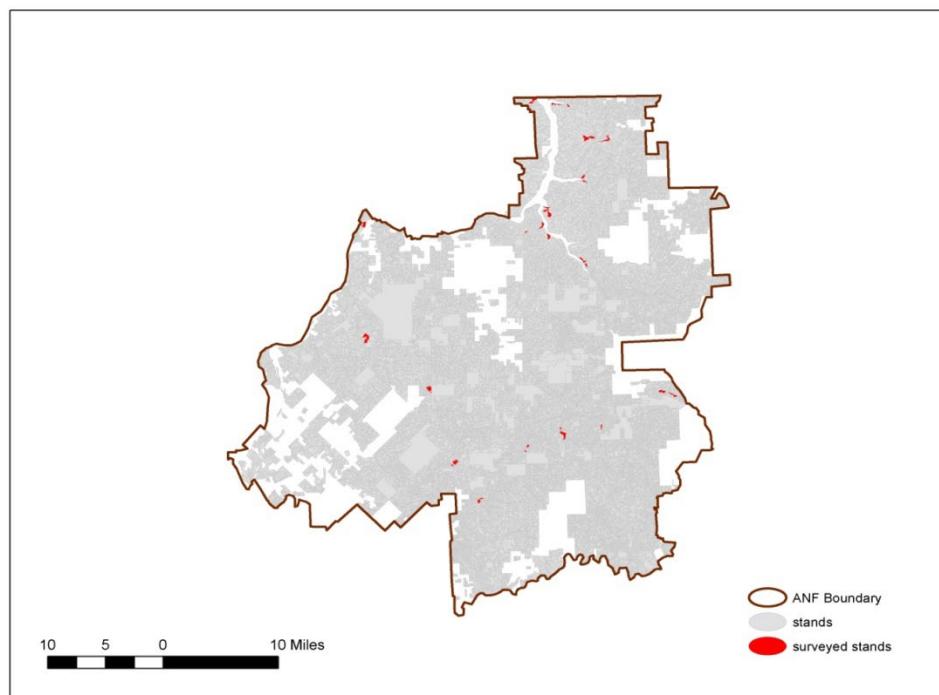
diameter class, quality class, wildlife use, snag decay class, amount of dieback (none, 1-25%, 26-50%, 51-75% >75%), and the presence or absence of epicormic branching, woodpecker activity, bark splitting, and tree damage agents. On the understory plots all tree seedlings taller than 2 inches but less than 1 inch dbh were identified, counted, and placed in height classes (2 inches to 3 ft., 3-5ft. 5 ft. to 1" dbh). All data collected by TEAMs was summarized in ExamsPC and uploaded to FSVeg.

## Results

### *Stands summaries*

No inventoried stands on the forest are classified specifically for ash. Ash does appear as a minor component in most forest types that occur on the ANF, and as a dominant tree in combination with other tree species on two forest types, White Pine/Northern red oak/White ash, Allegheny hardwoods (Black cherry/white ash/ yellow poplar). Ash occurs as a component (more than 1 square foot of basal area per acre) in 5,082 inventoried stands on the ANF (query of the FSVeg database in 2010).

Sixty four stands, twenty on the Marienville Ranger District and 44 on the Bradford Ranger District covering more than 1,500 acres were surveyed in this project (Figure 2). Most of the stands and areas surveyed had some forest type associated with them but 41% of the areas and stands were unclassified for forest type (Table 1). The type and number of stands and areas survey are presented in Table 2.



**Figure 2.** Location of the sixty-stands surveyed on the Allegheny National Forest.

No surveyed stands on the Marienville Ranger District were found to contain ash. Thirty one stands on the Bradford Ranger District were found to contain ash. The highest basal area was found in compartment 457 stand 24 which contained 19.1 ft<sup>2</sup> of basal area per acre (Table 3). Five of the surveyed stands were found to have ash in the understory but not in the overstory plots (Table 3). Live and dead basal area per acre and percent dead for the major tree species are shown in Table 4. The top five dominant species found in the survey were red maple (*Acer rubrum*), black cherry (*Prunus serotina*), northern red oak (*Quercus rubra*), eastern hemlock (*Tsuga canadensis*) and red pine (*Pinus resinosa*). Among the species, standing dead was highest in American beech (*Fagus grandifolia*; 26 percent), which is likely the result of beech bark disease which has been on the forest since the early 1980s (Table 1). Cucumber tree (*Magnolia acuminata*) had

the next highest levels of mortality 14.3 percent followed by yellow birch (*Betula alleghaniensis*) and sweet birch (*Betula lenta*) at 12.8 and 12.5 respectively. Most birch trees on the ANF become infected with the Nectria fungus and few exceed 60 years of age (Morin *et al.*, 2006). The cause of the high percentage of mortality found in cucumber tree is less known but maybe worth investigating further.

**Table 2.** Type and number of stands sampled.

Stand type	Number of stands
Campground	37
General forest	12
Trailhead	8
Boating area	5
Overlook	1
Swimming area	1

**Table 3.** inventoried compartment and stands on the Bradford Ranger District found to containing overstory or understory ash.

Compartment	Stands	Basel Area (ft <sup>2</sup> /acre)
201	18, 19	8.5, 6.3
279	30, 32, 33	3.6, 1.8, 0.0
287	8, 17	1.0, 0.0
317	38, 39, 55	12.7, 18.2, 2.5
409	2, 3, 10	2.5, 0.0 ,1.8
412	16, 17, 21	4.3, 11.5, 0.0
420	14, 16	0.8, 0.8
422	1	2.7
443	29	8.2
446	16	3.3
447	11	1.6
457	7, 24	0.0, 19.1
486	42	3.0
487	15	6.0
489	10, 11	4.5, 22.0
495	7, 10, 11	2.7, 9.9, 5.8

White ash accounted for a little over 2 ft<sup>2</sup> of live basal area per acre, or about 2 percent of the total basal area of all trees. Percent dead was below the average of 6.9 percent for all species at

3.7 percent. The results for live and dead basal area per acre and percent dead for the major tree species by district are shown in Tables 4 thru 6. Little change in the order of the major tree species was found between districts.

**Table 4.** Live and dead basal area (ft<sup>2</sup>) for major tree species all stands.

Species	Basal area/acre		
	Live	Dead	Percent dead
Red maple	22.5	0.9	3.8
Black cherry	21.2	1.8	7.8
Northern red oak	14.7	0.2	1.3
Eastern hemlock	14.6	0.6	3.9
Red pine	14.4	1.3	8.3
Sugar maple	9.0	0.4	4.3
American beech	7.5	2.7	26.5
Sweet birch	4.2	0.6	12.5
Yellow birch	3.4	0.5	12.8
Eastern white pine	3.1	0.1	3.1
White ash	2.6	0.1	3.7
Black oak	2.5	0.1	3.8
Chestnut oak	2.0	0.1	4.8
American basswood	1.8	0	0
American hornbeam	1.7	0	0
Cucumbertree	1.2	0.2	14.3
<b>Average</b>	<b>7.9</b>	<b>0.6</b>	<b>6.9</b>

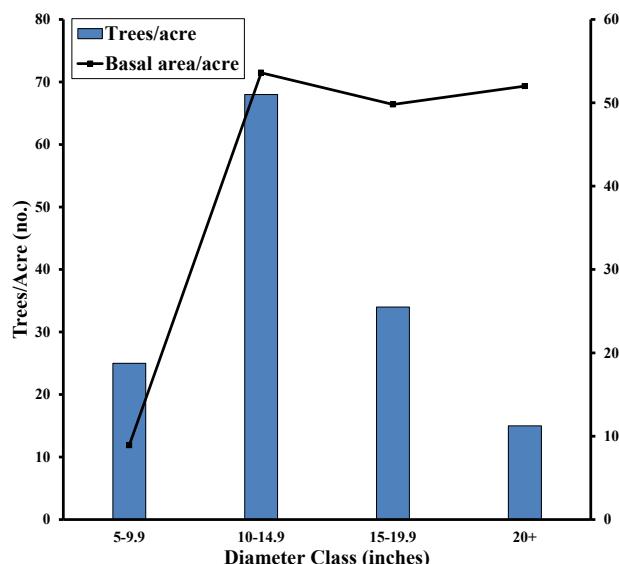
**Table 5.** Live and dead basal area (ft<sup>2</sup>) for major tree species Marienville Ranger District stands.

Species	Basal area/acre		
	Live	Dead	Percent dead
Black cherry	39.2	4.5	10.3
Eastern hemlock	23.4	1.0	4.1
Red maple	18.2	0.7	3.7
Sugar maple	12.6	0.2	1.6
Red pine	11.7	0.3	2.5
American beech	11.6	4.8	29.3
Yellow birch	5.2	0.9	14.8
Sweet birch	2.8	0.5	15.2
Eastern white pine	1.7	0.1	5.6
American hornbeam	0.6	0.0	0.0
American basswood	0.3	0.0	0.0
Cucumbertree	0.2	0.0	0.0
White ash	0.0	0.0	0.0
Chestnut oak	0.0	0.0	0.0
Northern red oak	0.0	0.0	0.0
Black oak	0.0	0.0	0.0
<b>Average</b>	<b>7.9</b>	<b>0.8</b>	<b>5.4</b>

**Table 6** Live and dead basal area per acre ( $\text{ft}^2$ ) for major tree species Bradford Ranger District stands.

Species	Basal area/acre		
	Live	Dead	Percent dead
Red maple	24.5	0.9	3.5
Northern red oak	21.3	0.4	1.8
Red pine	15.6	1.7	9.8
Black cherry	13.0	0.6	4.4
Eastern hemlock	10.6	0.4	3.6
Sugar maple	7.4	0.4	5.1
American beech	5.6	1.7	23.3
Sweet birch	4.8	0.6	11.1
White ash	3.8	0.1	2.6
Eastern white pine	3.7	0.2	5.1
Black oak	3.6	0.1	2.7
Chestnut oak	2.8	0.2	6.7
Yellow birch	2.6	0.3	10.3
American basswood	2.4	0.1	4.0
American hornbeam	2.1	0.0	0.0
Cucumbertree	1.7	0.2	10.5
<b>Average</b>	<b>7.8</b>	<b>0.5</b>	<b>6.5</b>

Figure 3 shows the number of ash trees and basal area per acre for ash by 5-inch diameter classes. The majority of the ash trees present in the surveyed stands is in the 10-14.9 diameter class.



**Figure 3** Diameter distribution of ash by number of trees and basal area per acre in the surveyed stands.

### *Tree Damage*

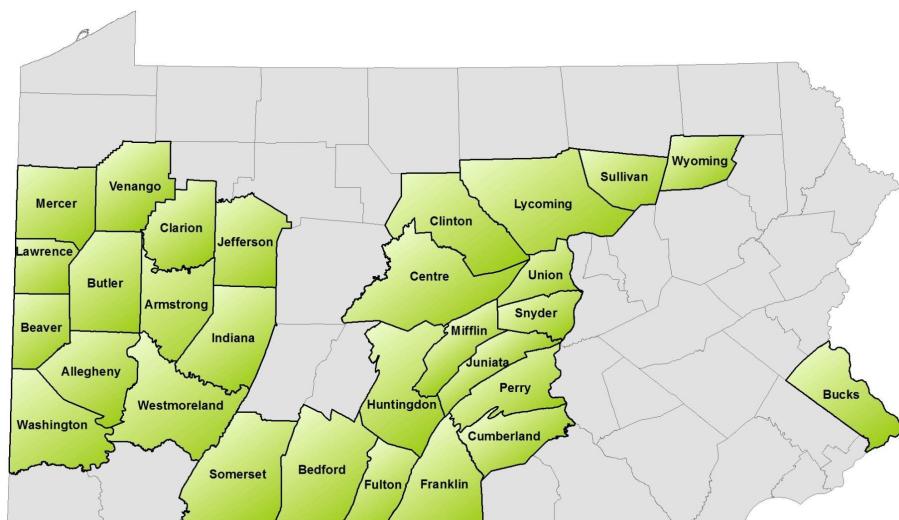
Insect activity was noted in overstory trees in 30 of 64 areas and stands surveyed. No signs or symptoms consistent with the emerald ash borer (e.g. epicormic branching, woodpecker activity, bark splitting, or boring insects) were noted in any of the ash trees surveyed.

## Discussion

Although EAB was not detected it is present within the adjacent counties (figure 4), and the ANF should be preparing for its arrival. This survey was the first step in the preparation of a monitoring strategy and management plan and demonstrates a commitment to ensure to the extent possible that ash species remain a viable component of the ANF. The information gathered in this survey and summarized in table 3 can now be used by both FHP and ANF personnel to prioritize areas for surveys, and better allocate resources as the ANF develops an ash management plan for the forest.

Based on the information gathered so far it is recommended that the ANF begin visual surveys and survey trapping (purple panel traps) for EAB in the spring of 2013 within high value stands and recreational areas known to contain ash.

As always it is important that field-going personnel continually monitor for evidence of EAB and other forest pests, report this information to the Morgantown Field Office or to the Pennsylvania Department of Agriculture.



**Figure 4.** Pennsylvania counties confirmed with emerald ash borer populations, August 27 2012.

## References

Beers, T. W. & Miller, C. I. (1964). Point sampling: research results, theory and applications., Vol. No. 786, 54: Purdue University Agricultural Experiment Station Research Bulletin.

Braun, E. L. (1950). *Deciduous forests of Eastern North America*. Philadelphia; Toronto.: Blakiston Co.

Morin, R. S., Liebhold, A. M., Gottschalk, K. W., Woodall, C. W., Twardus, D. B., White, R. L., Horsley, S. B. & T.E., R. (2006). *Analysis of forest health monitoring surveys on the Allegheny National Forest (1998-2001)*. Gen. Tech. Rep. NE-339. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. .

USDA (2012). Common Stand Exam Users Guide. Vol. 2012: USDA Forest Service

Whitney, G. G. (1990). The History and Status of the Hemlock-Hardwood Forests of the Allegheny Plateau. *Journal of Ecology* 78(2): 443-458.